ABSTRACT OF THE DISCLOSURE

An invention for coherent array image formation and restoration is taught. The invention is applicable for both 2D and 3D imaging using either 1D or 2D arrays, respectively. A transducer array is subdivided into subarrays, each subarray having a number of adjacent array elements. All elements of each subarray transmit and receive in parallel. The signals received from each subarray are delayed and summed to form scan lines, or beams. The low-beam-rate beams formed from each subarray are upsampled and interpolated prior to forming high-beam-rate images. Depending on the subarray geometry, a subarray-dependent restoration filter is also applied to the subarray beams. The restored beams from each subarray are combined to form the final high-beam-rate image. The invention significantly reduces the front-end hardware complexity compared to conventional methods such as full phased array imaging with comparable image quality.